



Ontology Applications in Homeland Security

OntologySummit2011: Panel Session-9 "Grand Challenges"

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Ontology: Captures the semantics of a given domain; its concepts, relationship among concepts and attributes describing these concepts.

Uses of Ontology include:

- I. Resolution of semantic differences across sources of information and across domains thus, achieving effective information sharing and data integration
- II. Reasoning and inference – to identify for example, for a given emergency situation, default actions, resources, roles/responsibilities of relevant agencies.
 - In this case we express the ontology in a formalism which supports automated inferences, e.g., Description Logics

Ontology at DHS – example initiatives :

Infrastructure Taxonomy

- **DHS Infrastructure Taxonomy**
 - In protecting the nation’s critical infrastructure, it is important to facilitate communication and dissemination of information.
 - Infrastructure assets are first grouped onto broad infrastructure sectors (e.g., Transportation systems) and further categorized in more details -- up to five levels – sector, subsectors, segment , sub segment, and asset type.
 - For details see DHS-OIP Infrastructure Taxonomy, v4, 2010



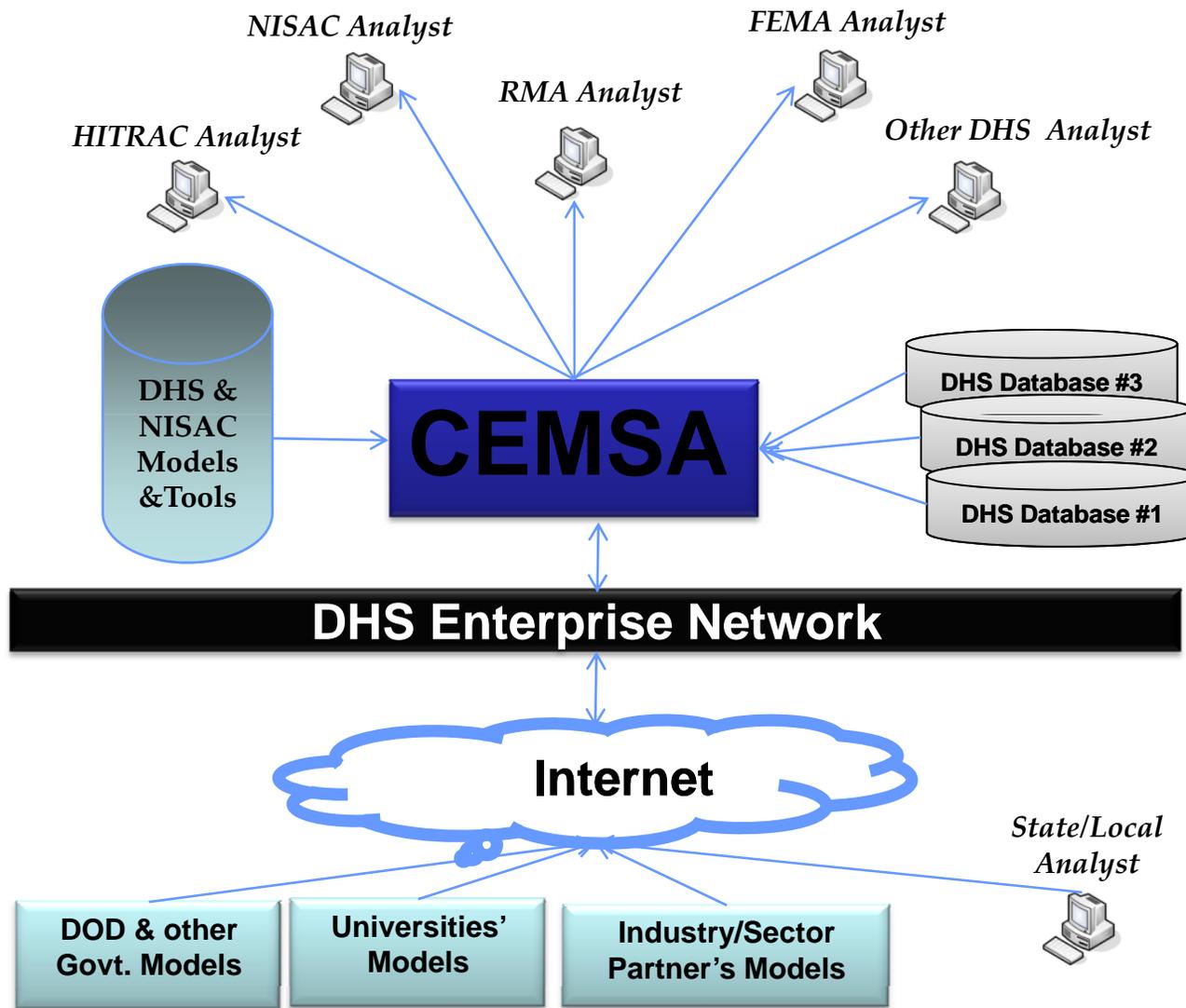
Ontology at DHS – Example of use of Ontology at DHS

- **Modeling, Simulation, and Analysis**
 1. Complex Event Modeling, Simulation, and Analysis (CEMSA) Program.
 - Helps achieve dynamic semantic models composability and interoperability Information sharing
 2. UICDS (Unified Incident Command and Decision Support Systems) program
 - A “middleware foundation” for
 - Enabling information sharing and decision support among commercial and government incident management technologies
 - Built to comply with & support NIMS, NRF and ICS



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Complex Event Modeling Simulation and Analysis (CEMSA)



CEMSA

Complex Event Modeling, Simulation, and Analysis (CEMSA) provides DHS analysts with models, simulations, tools, and data to assess the consequences of multiple interacting complex disruptions to critical infrastructure and key resources.

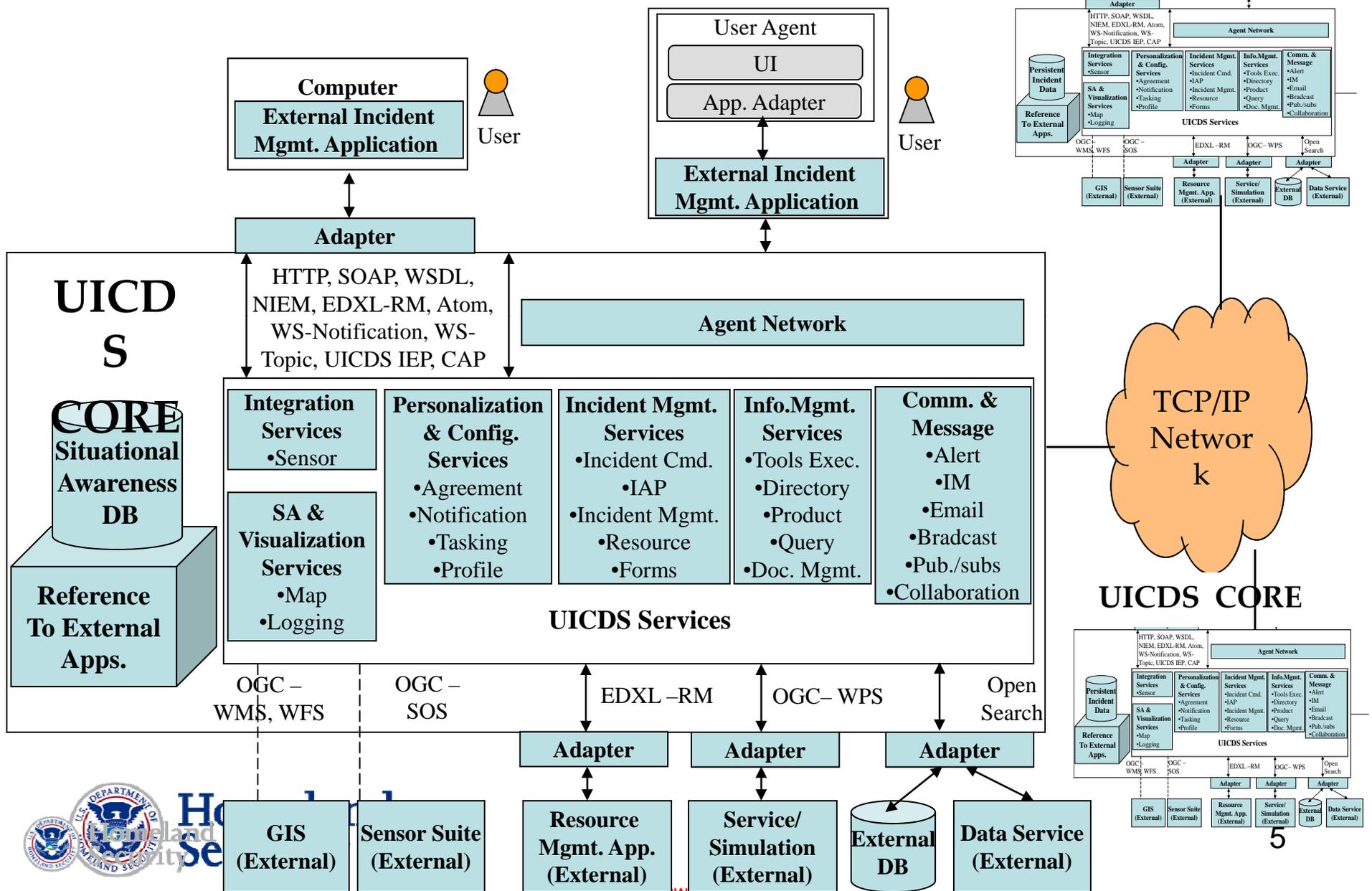
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UICDS: Architecture



Ontology- Challenges

- Ontology development – Human intensive
- Validation and gaining user credibility
- Ontology update
- Ontology integration





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